

What is claimed is;

1. A prospective abnormal shadow detecting system comprising a prospective abnormal shadow detecting means which detects a prospective abnormal shadow in an image on the basis  
5 of image data representing the image and a prospective abnormal shadow information output means which outputs information on the prospective abnormal shadow detected by the prospective abnormal shadow detecting means, wherein the improvement comprises that

10 a malignancy judging means which judges whether the prospective abnormal shadow detected by the prospective abnormal shadow detecting means is malignant or benignant is provided, and

15 the prospective abnormal shadow information output means outputs the information on the prospective abnormal shadow in such a manner that whether the prospective abnormal shadow is malignant or benignant as judged by the malignancy judging means can be distinguished.

2. A prospective abnormal shadow detecting system as  
20 defined in Claim 1 in which the prospective abnormal shadow information output means outputs an index of the malignancy and/or an index of the benignancy of the prospective abnormal shadow.

25 3. A prospective abnormal shadow detecting system as defined in Claim 1 in which the malignancy judging means judges whether the prospective abnormal shadow detected by the

prospective abnormal shadow detecting means is malignant or  
benignant by

obtaining a benignancy evaluation function value which  
is a value of an evaluation function for benignancy, a  
5 malignancy evaluation function value which is a value of an  
evaluation function for malignancy, and a normalcy evaluation  
function value which is a value of an evaluation function for  
normalcy by defining feature values of the image data by a  
predetermined function, and

10 comparing the normalcy evaluation function value with  
the benignancy evaluation function value and the normalcy  
evaluation function value with the malignancy evaluation  
function value.

4. A prospective abnormal shadow detecting system as  
15 defined in Claim 3 in which the malignancy judging means obtains  
first and second likelihood ratios LR1 and LR2 which are  
respectively defined to be  $LR1 = \text{normalcy evaluation function} / \text{malignancy evaluation function}$  and  $LR2 = \text{normalcy evaluation function} / \text{benignancy evaluation function}$ , and  
20 determines that the prospective abnormal shadow is malignant  
when the first likelihood ratio  $LR1 > \text{the second likelihood ratio } LR2$  and at the same time, the first likelihood ratio  $LR1 > \text{a first threshold value}$ , and that prospective abnormal shadow  
is benignant when the first likelihood ratio  $LR1 < \text{the second}$   
25 likelihood ratio  $LR2$  and at the same time, the second likelihood  
ratio  $LR2 > \text{a second threshold value}$ , and otherwise that the

prospective abnormal shadow is a shadow of a normal part.

5        5. A prospective abnormal shadow detecting system as defined in Claim 3 in which the normalcy evaluation function value is the Mahalanobis distance from a normal tissue distribution, the benignancy evaluation function value is the Mahalanobis distance from a benignant tissue distribution, and the malignancy evaluation function value is the Mahalanobis distance from a malignant tissue distribution.

10       6. A method of judging whether a prospective abnormal shadow detected on the basis of image data representing an image is malignant or benignant comprising the steps of

15       obtaining a benignancy evaluation function value which is a value of an evaluation function for benignancy, a malignancy evaluation function value which is a value of an evaluation function for malignancy, and a normalcy evaluation function value which is a value of an evaluation function for normalcy by defining feature values of the image data by a predetermined function, and

20       comparing the normalcy evaluation function value with the benignancy evaluation function value and the normalcy evaluation function value with the malignancy evaluation function value.

      7. A method as defined in Claim 6 characterized by the steps of

25       obtaining first and second likelihood ratios LR1 and LR2 which are respectively defined to be  $LR1 = \text{normalcy evaluation}$

function/malignancy evaluation function and LR2= normalcy evaluation function/benignancy evaluation function, and

determining that the prospective abnormal shadow is malignant when the first likelihood ratio  $LR1 >$  the second likelihood ratio LR2 and at the same time, the first likelihood ratio  $LR1 >$  a first threshold value, and that prospective abnormal shadow is benignant when the first likelihood ratio  $LR1 <$  the second likelihood ratio LR2 and at the same time, the second likelihood ratio  $LR2 >$  a second threshold value, and otherwise that the prospective abnormal shadow is a shadow of a normal part.

8. A method as defined in Claim 6 in which the normalcy evaluation function value is the Mahalanobis distance from a normal tissue distribution, the benignancy evaluation function value is the Mahalanobis distance from a benignant tissue distribution, and the malignancy evaluation function value is the Mahalanobis distance from a malignant tissue distribution.

9. An apparatus for judging whether a prospective abnormal shadow detected on the basis of image data representing an image is malignant or benignant comprising an evaluation function value calculating means which obtains a benignancy evaluation function value which is a value of an evaluation function for benignancy, a malignancy evaluation function value which is a value of an evaluation function for malignancy, and a normalcy evaluation function

value which is a value of an evaluation function for normalcy by defining feature values of the image data by a predetermined function, and

judging means which judges whether the prospective abnormal shadow is malignant or benignant by comparing the normalcy evaluation function value with the benignancy evaluation function value and the normalcy evaluation function value with the malignancy evaluation function value.

10. An apparatus as defined in Claim 9 in which the judging means obtains first and second likelihood ratios LR1 and LR2 which are respectively defined to be  $LR1 = \text{normalcy evaluation function} / \text{malignancy evaluation function}$  and  $LR2 = \text{normalcy evaluation function} / \text{benignancy evaluation function}$ , and determines that the prospective abnormal shadow is malignant when the first likelihood ratio  $LR1 > \text{the second likelihood ratio } LR2$  and at the same time, the first likelihood ratio  $LR1 > \text{a first threshold value}$ , and that prospective abnormal shadow is benignant when the first likelihood ratio  $LR1 < \text{the second likelihood ratio } LR2$  and at the same time, the second likelihood ratio  $LR2 > \text{a second threshold value}$ , and otherwise that the prospective abnormal shadow is a shadow of a normal part.

11. An apparatus as defined in Claim 9 in which the evaluation function calculating means calculates the Mahalanobis distance from a normal tissue distribution as the normalcy evaluation function value, the Mahalanobis distance

from a benignant tissue distribution as the benignancy evaluation function value, and the Mahalanobis distance from a malignant tissue distribution as the malignancy evaluation function value.

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